

I claim:

1. A method for operating a gas turbine engine prior to reaching self-sustaining speed, comprising:

a) rotating an engine rotor or turbine drive shaft of a gas turbine engine by an external source of power;

b) supplying compressed air and fuel to a combustion chamber of the gas turbine engine, thereby creating an air/fuel mixture in the combustion chamber;

c) igniting the air/fuel mixture;

d) sensing for ignition of the air/fuel mixture in the combustion chamber;

e) monitoring the EGT of the gas turbine engine, the rate of change of the EGT, the speed of the engine rotor or turbine drive shaft, the acceleration rate of the engine rotor or turbine drive shaft, and the temperature of the compressed air entering the combustion chamber;

f) defining a moderate EGT;

g) creating a table for determining rates of change of EGT based upon the rotational speed of the engine rotor or turbine drive shaft, the temperature of the compressed air entering into the combustion chamber, and the EGT;

h) creating a table for determining acceleration rates based upon the rotational speed of the engine rotor or turbine drive shaft, the temperature of the compressed air entering into the combustion chamber, and the EGT;

i) requesting a rate of change of EGT from the table of rates of change of EGT by a control system;

j) controlling the rate of change of the EGT by enabling a PID controller of the control system to control the amount of fuel entering into the combustion chamber by controlling the EGT around the moderate EGT;

k) requesting two acceleration rates by the control system, a current acceleration rate and an acceleration rate derived from the table of acceleration rates;

l) operating the external power source using the greater acceleration rate from the previous step; and

m) exiting the control system upon the engine either reaching self-sustaining speed or upon the engine not reaching self-sustaining speed within a predetermined time.

2. A method for operating a gas turbine engine prior to reaching self-sustaining speed, comprising:

- a) rotating an engine rotor or turbine drive shaft of a gas turbine engine by an external source of power;
- b) supplying compressed air and fuel to a combustion chamber of the gas turbine engine, thereby creating an air/fuel mixture in the combustion chamber;
- c) igniting the air/fuel mixture in a combustion chamber of a gas turbine engine;
- d) sensing for ignition of the air/fuel mixture in the combustion chamber;
- e) monitoring the EGT of the gas turbine engine, the rate of change of the EGT, the speed of an engine rotor or turbine drive shaft of the gas turbine engine, the acceleration rate of the engine rotor or turbine drive shaft, and the temperature of the compressed air entering the combustion chamber;
- f) requesting a desired rate of change of EGT by a control system;
- g) controlling the rate of change of the EGT by enabling a controller of the control system to control the amount of fuel entering into the combustion chamber;
- h) requesting two acceleration rates by the control system, a current acceleration rate and a desired acceleration rate;
- i) operating the external power source using the greater acceleration rate from the previous step; and
- j) exiting the control system upon the gas turbine engine either reaching self-sustaining speed or upon the gas turbine engine not reaching self-sustaining speed within a predetermined time.

3. The method as claimed in claim 2, further comprising the step of creating a table for determining rates of change of EGT based upon the rotational speed of the engine rotor or turbine drive shaft, the temperature of the compressed air entering into the combustion chamber, and the EGT.

4. The method as claimed in claim 2, further comprising the step of creating a table for determining acceleration rates based upon the rotational speed of the engine rotor or turbine drive shaft, the temperature of the compressed air entering into the combustion chamber, and the EGT.

5. The method as claimed in claim 3, wherein the rate of change of EGT is requested from the table for determining rates of change of EGT.

6. The method as claimed in claim 4, wherein the acceleration rate is derived from the table of acceleration rates.

7. The method as claimed in claim 2, further comprising the step of defining a moderate EGT.

8. The method as claimed in claim 7, wherein the amount of fuel entering into the combustion chamber is controlled by controlling the EGT around the moderate EGT.